

**MITIGATION ACTION PLAN
FOR THE PROTECTION OF THE
NATURAL AREA ON PARCEL ED-1**



April 2003

**U.S. Department of Energy
Oak Ridge Operations
Oak Ridge, Tennessee**

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Date Issued—April 2003

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ACRONYMS

BMAP	Biological Monitoring and Abatement Program
<i>CFR</i>	<i>Code of Federal Regulations</i>
CROET	Community Reuse Organization of East Tennessee
DOE	U.S. Department of Energy
EA	Environmental Assessment
EFPC	East Fork Poplar Creek
EIS	Environmental Impact Statement
EPT	Ephemeroptera + Plecoptera + Trichoptera
FONSI	Finding of No Significant Impact
MAP	Mitigation Action Plan
NEPA	National Environmental Policy Act of 1969
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
ROW	right-of-way
SR	State Route
T&E	threatened and endangered
TDOT	Tennessee Department of Transportation
TWRA	Tennessee Wildlife Resources Agency

1. INTRODUCTION

In January 1996, the U.S. Department of Energy (DOE) executed a lease for the approximate 957-acre Parcel ED-1 to the Community Reuse Organization of East Tennessee (CROET) to develop an industrial/business park (now known as the Horizon Center). The lease subsequently became effective in April 1998. This action was preceded by an Environmental Assessment (EA) (DOE 1996a) resulting in a finding of no significant impact (FONSI), conditioned upon the implementation of mitigation and monitoring of the sensitive areas of Parcel ED-1. According to DOE's National Environmental Policy Act of 1969 (NEPA) regulations [10 *Code of Federal Regulations (CFR)* 1021.322], a FONSI shall include “*any commitments to mitigations that are essential to render the impacts of the proposed action not significant, beyond those mitigations that are integral elements of the proposed action, and a reference to the Mitigation Action Plan prepared under 10 CFR 1021.331.*”

In accordance with the terms of the FONSI and as specified by 10 *CFR* 1021.331, a Mitigation Action Plan (MAP) was issued that described measures to be implemented to monitor and mitigate potentially significant adverse impacts that could occur from development on Parcel ED-1 (DOE 1996b). The MAP accomplished this by excluding areas of Parcel ED-1 from disturbance and development and requiring that surveys and monitoring be conducted on development areas prior to disturbance (pre-development) and during industrial operations (post-development). The objectives of these measures included: (1) protection of wildlife habitat, plant communities, threatened and endangered (T&E) species, water resources, wetlands, and historic and archaeological resources; (2) maintenance of habitat connections to reduce the ecological effects of fragmentation; (3) pre- and post-construction assessment of natural succession and impacts of development on natural communities and populations using data collected during monitoring; and (4) identification of additional mitigation, as needed, to remediate the actual adverse effects of development.

MAP objectives (1) and (2) were met by the establishment of a “Natural Area” (formerly referred to as the “Exclusion Area”) within which no development (e.g., construction of habitable structures) should occur except for areas of unavoidable encroachment (i.e., roads and utilities). To meet objective (3), Oak Ridge National Laboratory (ORNL) initiated ecological surveys in June 1996. These surveys comprised the majority of the pre-development monitoring of the areas excluded from industrial development. MAP objective (4), to date, has focused on preventing the introduction of exotic species into Parcel ED-1. CROET in its Covenants, Conditions, and Restrictions for the parcel has provided a list with native plant recommendations and a list of invasive exotic pest plants in Tennessee. Owners and occupants are encouraged to use plants from the native list for landscaping and to avoid the plants on the other list. Additional mitigation (i.e., restoration and/or compensation) has not been necessary, since no damages or adverse impacts have occurred that would require such measures.

A requirement of the MAP is the preparation of Annual Reports by DOE to document baseline conditions in the Natural Area; survey data and monitoring status; and planning, construction, and operational phases of the development. The 1997 Annual Report (DOE 1977) documented pre-development conditions to use as a baseline, and it established monitoring sites for future use. At the request of DOE, CROET assumed responsibility for the preparation of future annual reports. CROET in turn contracted with Lockwood Greene Engineers, Inc. to complete the monitoring requirements of the MAP. The 1998 Annual Report (DOE 1998) described progress toward meeting objectives of the MAP during the site development planning and early construction phases. Specifically, the report addressed development alternatives, pre-development surveys, and monitoring plans during early construction.

A plan was developed to meet economic development goals while adhering to the commitments in the FONSI and the MAP. A main goal of the development plan was to maximize developable acreage while preserving the important ecological and scenic features of the parcel (Fig. 1.1). Planning and layout

of the site also relied heavily on several ecological studies designed to locate T&E species and to minimize the impact to stream and floodplain crossings. The objective of the 1999 and 2000 Annual Reports (DOE 1999 and 2000) was to meet the NEPA commitment to monitor specified environmental resources during early site construction and operation as development matured.

CROET awarded construction contracts for clearing right-of-ways (ROWs) for roads, utilities, borrow areas, and a sub-leased parcel soon after the lease was activated in the summer of 1998. Permits were obtained for construction of culverts and bridges in late 1998. Construction of the culverts and bridges began in late 1998 and continued to completion in 1999. Permits were obtained for sewer and water distribution systems in 1999. Construction began on the first sub-leased parcel (the Theragenics Center) in the summer of 1999. Grading and the foundation for the Theragenics building were completed by the last of November, and erection of steel began in December. A major emphasis in 2000 was directed toward completing road construction, installing underground utilities in the road ROWs, and completing construction on the Theragenics Center.

Three new sites were cleared and prepared for construction in 2000 (Fig. 1.2). The first of these was an addition to the Communications Center and fiber-optics hub facility located on about 1 acre near the middle of Parcel ED-1. A second was the erection of a new telecommunications tower on approximately 0.25 acre of the northwest sector of the parcel. The third involved clearing and grading of approximately 15 acres along the Oak Ridge Turnpike [State Route (SR) 95] adjacent to the west entrance to the parcel. Activities since 2000 have primarily been to clear brush and remove dead pines (due to the Southern pine beetle infestation) at the corner properties where the park roads intersect with the Oak Ridge Turnpike, and to conduct other routine maintenance activities.

On February 21, 2002, CROET submitted a proposal to DOE requesting the title transfer of Parcel ED-1. Following that on August 19, 2002, CROET submitted a supplement to its proposal requesting that the developable portion of Parcel ED-1 be transferred to Horizon Center LLC, a subsidiary of CROET. DOE initiated activities in March to meet the requirements necessary to support the title transfer, including reviewing and updating the NEPA documentation.

One of the first actions by DOE after receipt of CROET's proposal for the transfer of Parcel ED-1 was to convene a DOE peer review of the existing MAP. The Peer Review Team met in Oak Ridge on March 12–14, 2002. The goals of the Team were the following:

1. Assess the monitoring data collected to date and establish if the requirements of the MAP have been met.
2. Determine if changes to the MAP are warranted due to the intended future use of Parcel ED-1 and plans for activities adjacent to the parcel [e.g., Tennessee Department of Transportation (TDOT) expansion of SR 95].
3. Clarify the future monitoring and mitigation requirements, including defining when mitigation is necessary.
4. Identify when the next review of the MAP should be conducted.

DOE completed an EA Addendum (DOE/EA-1113-A) for the transfer of title of Parcel ED-1 to CROET. After review of the analysis, DOE issued a FONSI for the proposed action, conditioned upon the implementation of mitigation and monitoring to continue to protect environmental resources.

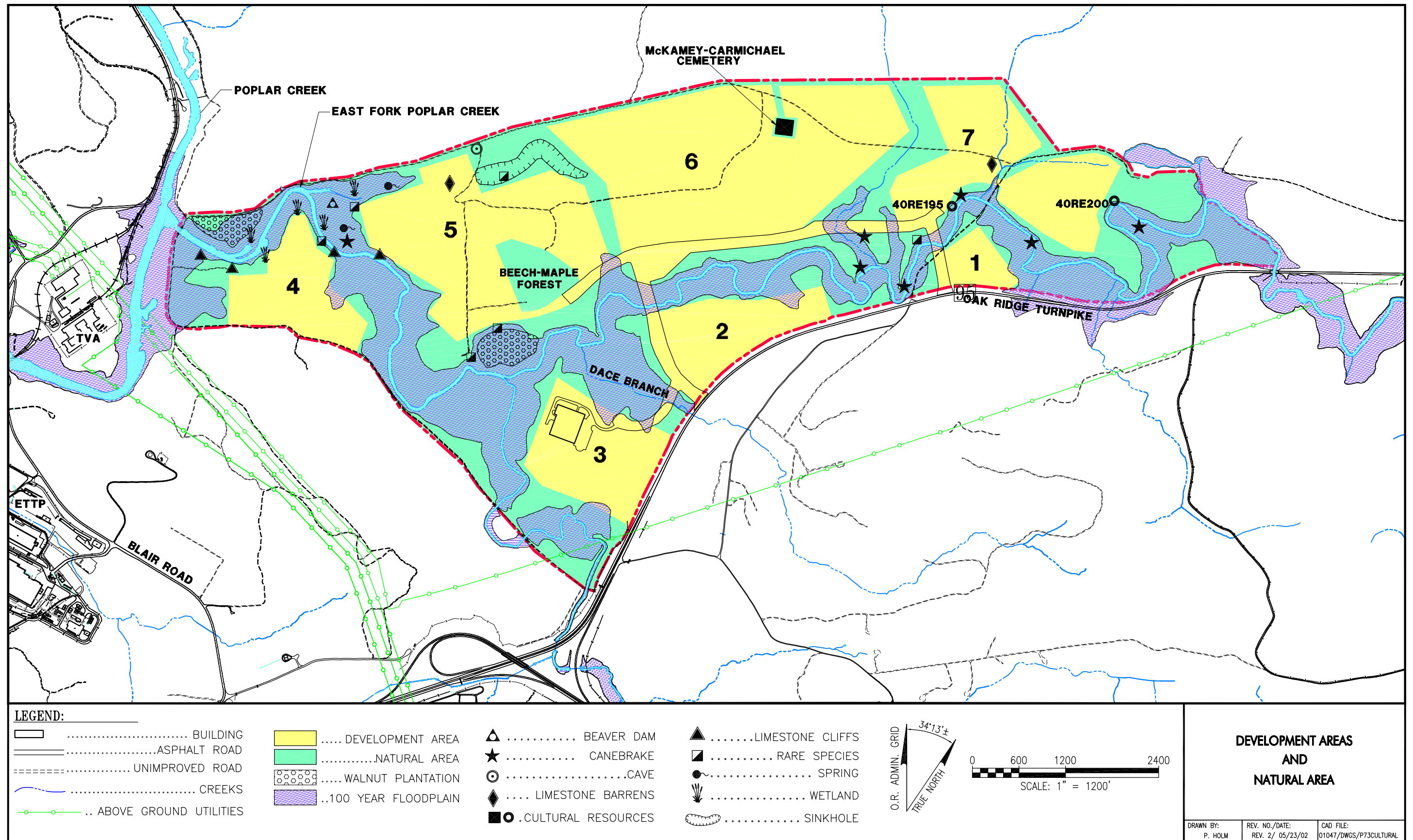


Fig. 1.1. Parcel ED-1 Development Areas and Natural Area

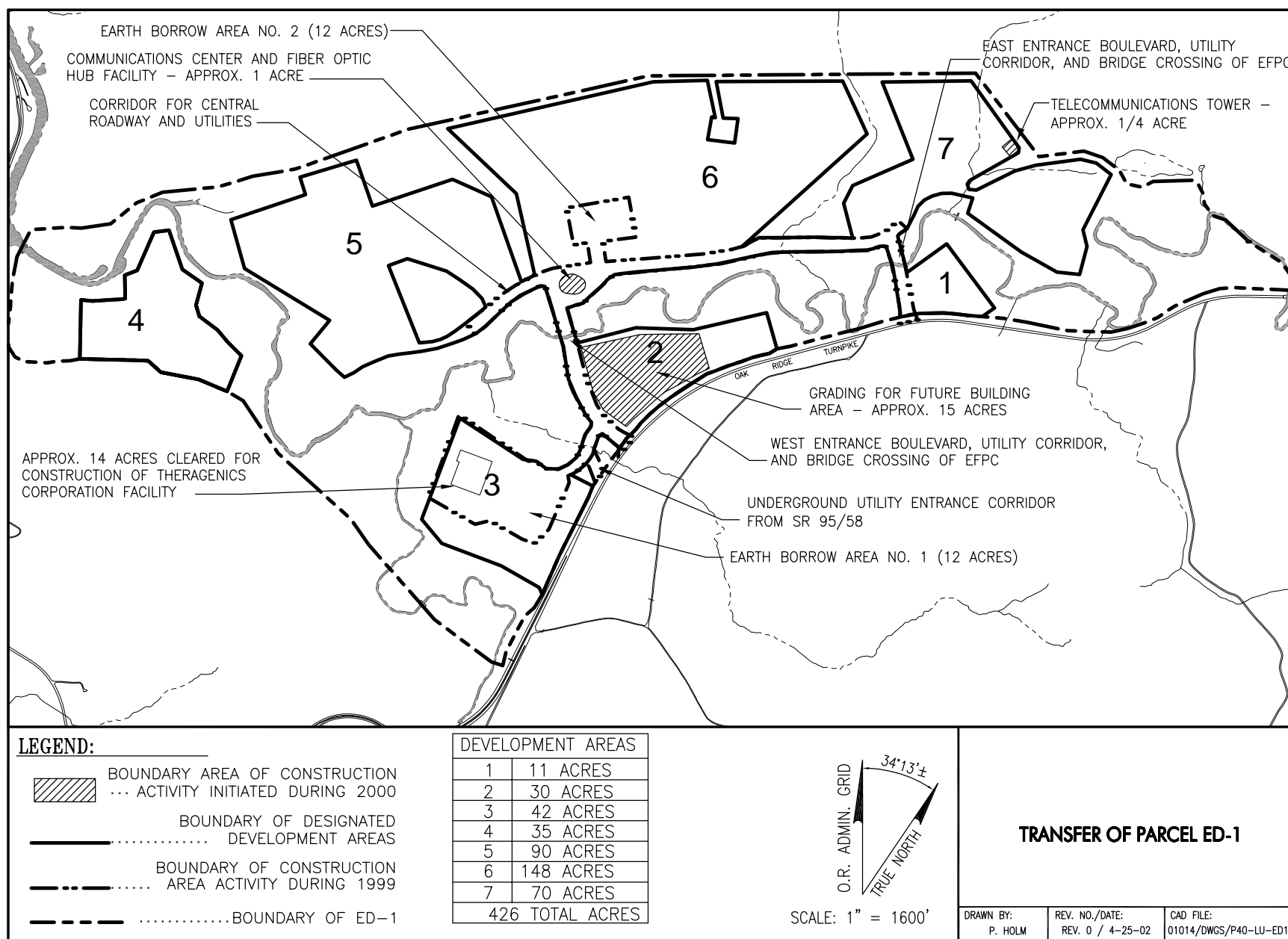


Fig. 1.2. Parcel ED-1 Construction Activities for 1999 and 2000.

The requirement that Horizon Center LLC monitor the Natural Area and perform mitigation of any of the sensitive resources within the Natural Area, if necessary, will be in the lease. If Horizon Center LLC fails to abide by the provisions of the lease within the specified cure period, then DOE and Horizon Center LLC may resolve the dispute subject to the dispute clause in the lease. Ultimately, DOE has the right of termination if the requirements are not met.

This MAP incorporates the recommendations of the DOE peer review. It also contains a summary and quantitative evaluation of monitoring data collected between 1996-2000, and monitoring requirements and mitigation measures for ecological and cultural resources. The objectives of these measures include: (1) to assess whether the integrity of the sensitive resources within the Natural Area is being maintained and to identify encroachments and any necessary maintenance or potential mitigation; (2) continuation of monitoring to detect and characterize changes from the baseline (pre-development) conditions and to determine if significant adverse impacts are occurring; and (3) mitigation, as needed, to help avoid, minimize, or remediate any adverse impacts to the sensitive areas. The MAP also contains a section describing review and reporting requirements.

Copies of this MAP may be reviewed at, and annual reports may be obtained from, the address listed below.

U.S. Department of Energy
Information Center
475 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830
Phone: (865) 241-4780 or 1-800-382-6938

2. DATA SUMMARY

Based on a recommendation from the peer review, DOE undertook a technical review of the existing data that have been collected on Parcel ED-1 to evaluate whether any significant adverse impacts have occurred and to provide the basis for the changes recommended in this revised MAP.

2.1 SUMMARY OF MONITORING ACTIVITIES

The previous MAP specified that post-development monitoring was to be conducted in the Natural Area and possibly off-site (e.g., north of the site) as development progressed. The monitoring plan included quarterly (seasonal) surveys by plant and wildlife ecologists in the Natural Area; triennial vegetation and wetland surveys; and annual monitoring of game populations (wild turkey, waterfowl, and deer), birds in the terrestrial ecosystem, and fish and benthic macroinvertebrates in the aquatic ecosystem. Monitoring surveys of birds, fish, and benthic macroinvertebrates were to be conducted annually. After a period of three years, the suitability of less frequent monitoring was to be re-evaluated.

The following table presents a summary of the ecological monitoring conducted by ORNL and Lockwood Greene between 1996 and 2000 (Table 2.1). The information and data were obtained from the DOE Annual Reports (1997–2000).

Table 2.1. Summary of ecological monitoring on Parcel ED-1

Monitoring Type	Year					Comments
	1996	1997	1998	1999	2000	
Terrestrial Vegetation	x	x	x	--	--	T&E, 5 sensitive communities, 5 common habitat-strata types
Birds	x	x	--	x	x	2 seasons, 2 routes
Fish	x	x	x	x	x	2 seasons, 4 stations
Benthic macroinvertebrates	x	x	x	x	x	2 seasons, 4 stations
Bats	--	x	--	--	--	47 net nights over 27 sites
Lepidoptera	--	x	--	--	--	3 sites
Mammals, Reptiles	--	x	--	--	--	16 sites, 6 habitat types
Amphibians	--	x	--	x	--	5 sites for 6 months
Game	--	x ^a	--	--	--	deer, turkey, duck, bobwhite

Source = Parcel ED-1 Annual Monitoring Reports (DOE 1997-2000).

^a Data for animals harvested during hunting.

x = data collected.

-- = data not collected.

T&E = Threatened and endangered.

2.1.1 Terrestrial Ecosystem

2.1.1.1 Vegetation

Terrestrial vegetation for portions of Parcel ED-1 was quantitatively surveyed in 1996, 1997, and 1998.

Numbers of individual sensitive, rare, and/or protected plant species of different types were enumerated between June and September in 1996 and in May of 1997. The beech-maple forest (three sites) was surveyed in June 1997, resulting in estimates of abundance, basal area, density, and percent exotics. Two sections of the limestone cliffs on the parcel were qualitatively surveyed in July 1996 resulting in lists of native species and exotics. One site in the limestone barren was surveyed in July 1996; red cedars and other woody species of different sizes were enumerated, percent woody cover was estimated, and woody and exotic species were listed. Lists of dominant species in four Parcel ED-1 wetlands were made in July 1996. The percent cane cover was estimated for a canebrake site.

Ground cover, seedling/sapling/shrub habitat, floodplain forest, and upland forest were surveyed at numerous sites in May and June 1996. The number of species; total cover and percent exotics in ground cover; and total density of seedlings, saplings, and shrubs and percent exotics were measured at 18 sites. The number of individuals per species and basal area were measured at 12 floodplain forest sites and six upland forest sites. In 1998, lists of species were compiled for 12 areas to be cleared for road construction.

2.1.1.2 Birds

Birds were quantitatively surveyed in two seasons (spring and fall) along two monitoring routes (perimeter and floodplain) in each of the years 1996, 1997, 1999, and 2000. In each year, surveys were conducted identically using the point-count method (Hamel et. al. 1996) with 19 points along the periphery route and 25 points along the floodplain route. Additional counts were made of the number of species and individuals at two bridge sites located on the floodplain route.

2.1.1.3 Game species

DOE has monitored deer and wild turkey populations on the Oak Ridge Reservation (ORR), including Parcel ED-1, during controlled hunts managed by DOE and the Tennessee Wildlife Resources Agency (TWRA) since 1985. Hunting was discontinued on Parcel ED-1 starting in 1997, and no harvest records for the parcel are available since that time. No attempts have been made to quantify populations of whitetail deer, wild turkey, wood duck, mallard duck, and northern bobwhite. Only casual observations of these species have been reported.

Deer have continued to be observed on Parcel ED-1 and are common. They move over most of the parcel during non-work hours. Tracks of buck, doe, and young have been observed in roadways, clearings, and around water sources (DOE 2000).

Prior to the development of Parcel ED-1, the area provided prime habitat for wild turkey. The secondary succession resulting from pine beetle destruction of timber and the subsequent timbering operations reduced the area of prime habitat on the parcel. Construction activities during 1998–2000 further reduced the amount of habitat. Even with the reduction in habitat, wild turkey continue to be observed throughout the year, including several broods of young poults observed during spring 2000 (DOE 2000).

From 1993 to 1997, TWRA and ORNL staff conducted surveys from canoes in June for wood ducks on the lower reach of East Fork Poplar Creek (EFPC). Adults with young were observed in 3 out of 5 years, and lone adults were observed in each of the 5 years. While no canoe surveys were conducted in 1998 or 1999, lone adults were heard and seen on EFPC. Three breeding pairs were identified in spring 2000. Two groups of wood ducks were flushed during early December 2000, indicating they use EFPC as a winter habitat (DOE 2000).

Mallard ducks were not reported as occurring on Parcel ED-1 in the baseline census (DOE 1997) or the first census following the beginning of construction. However, in the spring census of 2000, breeding mallard ducks were reported on EFPC. They have also been heard and seen on other occasions throughout the year and, therefore, are considered a permanent resident on the parcel (DOE 2000).

Northern bobwhite is considered a declining species on the ORR (DOE 2000). This has also been true for the bobwhite population on Parcel ED-1. However, they were seen in the upland and floodplain habitats in the spring and summer of 2000. The increased open area and edge along with secondary succession may provide habitat that supports the recovery of this game bird on the parcel (DOE 2000).

2.1.1.4 Other species

Bats, moths, and butterflies (Lepidoptera), mammals, reptiles, and amphibians were quantitatively surveyed as part of the pre-development monitoring for T&E species, as specified by the MAP. Bats netted in June and July 1997 were identified to species and sexed. Two to four nets were set each night at a total of 27 sites over 16 nights (47 net nights total). Lepidopterans (butterflies, moths, and skippers) and their host plants were counted at three sites during 16 dates between June 24 and July 22 in 1997. The number of individuals and species of small mammals, reptiles, and amphibians observed or trapped during surveys of 16 sites distributed among six habitat types (bottomland forest, beech-maple forest, oak-hickory-ash limestone woodland, clearcut areas, limestone cliff area, and hardwood plantations) between March and July 1997 were recorded. The relative intensity of calling activity of different frog species was quantified once per month between March and August at five sites in 1997 and again in 1999. No T&E species were identified by those surveys.

2.1.2 Aquatic Ecosystem

Fish and benthic macroinvertebrates were surveyed in two seasons (spring and fall) at several stations within Parcel ED-1 in each of the years 1996 through 2000. Data collected by the Biological Monitoring and Abatement Program (BMAP) between 1984 and 2000 from stations on or near Parcel ED-1 supplemented the other data. Fish were sampled by electroshocking, and the identity, length, and weight of collected fish were recorded in one or more years. Benthics were sampled using a surber sampler and/or kick net with three or four replicates per site resulting in counts of individuals of different taxa, including chironomids and Ephemeroptera + Plecoptera + Trichoptera (EPT) taxa.

2.2 QUANTITATIVE EVALUATION OF MONITORING DATA

Quantitative monitoring data for terrestrial and aquatic ecosystems at Parcel ED-1 indicate few trends and no significant adverse impacts. The results of the trends analyses for birds, benthic macroinvertebrates, and fish monitoring data are presented in Appendix A and summarized below. Power tables presented in Appendix B can be used to estimate the statistical power of the data to detect trends. The results of the data evaluation and power tables were used to recommend revisions to the MAP and to meet the requirements of the FONSI (see Sect. 3.1.2).

2.2.1 Terrestrial Ecosystem

Trends in the vegetation data could not be evaluated because data were not collected in similar times of the year in more than 2 years at any site.

As specified in the MAP, birds were quantitatively surveyed in two seasons (spring and fall), along two routes (perimeter and floodplain), in each of the years 1996, 1997, 1999, and 2000 using identical survey methods. No significant trends ($Pr > 0.05$ that slope = 0) were detected in the total bird abundance and species richness, abundance of birds of conservation concern, and abundance of birds on the Partners in Flight National Watch List. The large increase in bird abundance and richness in 1997 is not explained by changes in survey methodology or personnel. ORNL personnel conducted both the 1996 and 1997 surveys using identical methods, and subsequent survey by Lockwood Greene used the same methods and level of effort.

Because there are data for two or fewer years, trends and impacts for bats, moths, and butterflies (Lepidoptera), mammals, reptiles, and amphibians could not be evaluated.

2.2.2 Aquatic Ecosystem

Fish and benthic macroinvertebrates were surveyed in two seasons (spring and fall) at several stations within Parcel ED-1 in each of the years 1996 through 2000 and between 1984 and 2000 from BMAP stations on or near Parcel ED-1. No significant trends were detected in benthic macroinvertebrate abundance, taxonomic richness, percent EPT, and average percent chironomids at Parcel ED-1 stations EFK2.3, EFK5.1, BCK0.1, and DBK0.3 (Appendix A). A significant trend of increasing total abundance was detected in the fall at BCK3.3, upstream of Parcel ED-1, between 1984 through 2000. Significant increasing trends in taxonomic richness and percent EPT were detected in the fall at stations EFK6.3 on Parcel ED-1 prior to construction (1985 through 1995) and in both spring and fall samples at BCK 3.3 (1984 through 2000). A significant trend of decreasing percent chironomids in the spring was detected at Dace Branch at Parcel ED-1 (DBK0.3) between 1997 and 2000. No significant trends were detected in fish density, taxonomic richness, percent generalist feeders, percent piscivores, and percent tolerant species at Parcel ED-1 stations EFK2.3, EFK5.1, BCK0.1, and DBK0.3 (Appendix A). Between 1988 and

2000, significant trends of increasing taxonomic richness and decreasing percent generalist feeders in both the spring and fall, and decreasing percent piscivores in the fall, were detected in data from BCK3.3 upstream of Parcel ED-1. A significant trend of increasing number of fish taxa in the fall season was detected at station EFK6.3 on Parcel ED-1 (1985 through 1999). The significant trends at individual stations, except decreasing piscivores at BCK3.3, are generally considered to be indicative of improving conditions. While increasing taxonomic richness at EFK6.3 in and of itself is not definitively indicative of improving conditions, the coincident increase in percent EPT indicates the direction of change in the community was generally positive.

3. MONITORING AND MITIGATION

3.1 ECOLOGICAL RESOURCES

3.1.1 Inspections

Horizon Center LLC will be responsible for conducting on-site inspections of the sensitive areas (Fig. 1.1) within the Natural Area boundary on Parcel ED-1 three times each year: December–January (before the ideal construction time), April–June (during flowering, nesting, and spring migrations), and September–October (following the prime construction period). The following areas will be inspected:

- perimeter boundary of the Natural Area,
- cave,
- sinkholes,
- canebrakes,
- springs,
- wetlands,
- rare species locations,
- east and west corridors,
- walnut plantations,
- beech-maple forest, and
- EFPC and Dace Branch buffer zones.

These inspections will be conducted to assess whether the integrity of the sensitive areas within the Natural Area is being maintained and to identify encroachments and any necessary maintenance or potential mitigation. The inspections will be conducted by qualified wildlife and plant biologists/ecologists who will observe and record the following:

- General condition of the vegetation within each area. Major changes or perturbations should be recorded (e.g., stressed vegetation or encroachment by exotic/invasive plant species).
- Observations of any wildlife.
- General condition of streams and springs (e.g., fish kills, excessive turbidity or sedimentation, oil sheens, foam, etc.).

During construction activities, Horizon Center LLC, or its designee, will conduct more frequent inspections of areas being disturbed to ensure that minimal encroachment of the Natural Area boundary is

occurring and that no significant adverse impacts occur. These inspections will be in addition to any other inspections that may take place by city or state officials (i.e., codes or other regulatory enforcement).

3.1.2 Monitoring

Monitoring was specified in the MAP (DOE 1996b) to detect and characterize changes from the baseline (pre-development) conditions. Sampling methods, intensity, and frequency specify the data quality objectives. The sampling method specified in the MAP (DOE 1996b) and natural variability at Parcel ED-1 determined the statistical confidence (alpha) and power to detect changes and trends of different magnitude. Sampling intensity and frequency should be reconsidered periodically based on the observed variability and potential to detect ecologically significant trends.

3.1.2.1 Birds

Given the power of current bird surveys to detect decreases in bird abundance and species richness, monitoring of birds will continue for at least 3 more years with the first of those 3 years to include the 2002 data already collected. Annual sampling conducted over this period of time (1996 through 2004) should detect a decrease of 5% per year in bird abundance and species richness, if it occurs, with a probability between 0.33 and 0.65 for total abundance and a probability greater than 0.65 for species richness. The bird surveys will be conducted in the spring, preferably during the months of May and June, which is the prime nesting season for most birds. The standard procedure that has been used for the previous surveys will continue to be used including the use of the two established routes (floodplain and periphery). This will ensure that the future data collected can be statistically compared with the historical data. The need for further monitoring can be evaluated using these data.

3.1.2.2 Amphibians

The peer review recommended that a baseline be established for amphibians in the planned wildlife corridors located on Parcel ED-1 (Fig. 1.1). CROET performed a survey of amphibians in 2002 (June-July). Methods used were consistent with those used during the pre-development surveys conducted in 1997 by ORNL (DOE 1997a) and included pitfall trap arrays and transects with and without drift fences, artificial covers, and active searches. All species either trapped or observed were recorded and the results will be presented in the next Annual Report. Additional monitoring of amphibians can be conducted by recording observations made during the on-site inspections, which include inspections of the wildlife corridors.

3.1.2.3 Benthic macroinvertebrates

Monitoring of benthic macroinvertebrates will continue. Benthic macroinvertebrates are likely more sensitive than fish to the potential impacts associated with development (e.g., siltation and water quality impairment) and, thus, will serve to indicate changes in the aquatic ecosystem. Benthic macroinvertebrates will be sampled once per year, in the spring. Monitoring will occur at upstream station EFK 6.3 and downstream station EFK 2.3. In accordance with the MAP (DOE 1996b) and recommendation of the peer review, the frequency of sampling is reduced to once per year because major adverse changes were not detected after 3 years of monitoring. A greater abundance and diversity of benthic macroinvertebrates and EPT taxa are expected in the spring than the fall. The method for conducting the benthic sampling will be the same as what has been used previously. The resulting data will allow analysis for trends in total abundance, taxonomic richness, percent EPT, and percent chironomids. Annual monitoring in the spring season will continue for at least 3 more years with the first of those 3 years to include the 2002 data already collected. Over 8 years, annual sampling should be able to detect a decrease of 5% per year in total abundance, richness, and percent EPT with a probability between 0.23 and 0.65. After a total of 8 years, the need for further monitoring can be re-evaluated using these data.

3.1.2.4 Fish

As recommended by the peer review, monitoring of the fish community in Dace Branch will continue. This is because it contains a reproducing population of the Tennessee dace, which is listed by the state as “Deemed In Need of Management.”

Site preparation and construction activities during 1998 and 1999 resulted in exposing large areas of soil in the vicinity of Dace Branch. Two major storm events in the early spring of 1999 caused runoff to overrun the silt fence allowing sediments to enter Dace Branch, which may have adversely impacted the Tennessee dace. In fall 1998, the number of Tennessee dace was 19, a number higher than previously recorded (DOE 1998). In spring 1999, four individuals were found (DOE 1999). In October 1999, there were only two individuals, and none was found during the spring 2000 sampling (DOE 2000). A population of Tennessee dace was found upstream of the normal sampling location (DBK 0.3). This population was located upstream from influences of construction and downstream from culverts under the Oak Ridge Turnpike. These fish may repopulate the downstream reaches of Dace Branch as the stream recovers from the 1999 siltation events. Continued sampling will confirm recovery.

The Dace Branch will be sampled annually during the spring (April-May) for at least 3 more years (8 years total). The 2002 data already collected will be counted as the first of the 3 years. Annual sampling over 8 years should be able to detect a decrease of 5% per year in species richness with a probability greater than 0.88. After a total of 8 years, the need for further monitoring can be evaluated using these data.

3.1.3 Mitigation

The peer review recommended that the MAP clarify future mitigation requirements, including defining when mitigation is necessary. The Council on Environmental Quality *Regulations For Implementing The Procedural Provisions Of The National Environmental Policy Act* (40 CFR 1500-1508) defines mitigation as follows:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

DOE and CROET have already mitigated potential impacts to certain sensitive resources found on Parcel ED-1 by establishing the Natural Area. This action has served to avoid, minimize, reduce, and in many cases eliminate impacts to the sensitive resources found on the parcel. Horizon Center LLC will continue to be responsible for the preservation and maintenance of the integrity of the Natural Area, including the sensitive resources it contains.

Horizon Center LLC also will continue to provide mitigation by continuing to recommend that native plants be used for all revegetation of disturbed areas and landscaping of developed areas. These species should be native to the Ridge and Valley Province and consistent with local community types (see the

recommendation in the Horizon Center Covenants, Conditions, and Restrictions document). Lawn areas will also be kept to a minimum to the extent possible.

To help control erosion and sedimentation during land disturbing activities, best management practices like those described in the *Tennessee Erosion & Sediment Control Handbook* (TDEC 2002) will be used as appropriate. These best management practices can include vegetative practices (e.g., buffer zones and temporary vegetation), structural practices (e.g., silt fences, diversions, sediment basins) or a combination of both. In addition to the proper design and installation, any best management practices must also be properly maintained in order to effectively reduce erosion and sedimentation.

If, based on the tri-annual on-site inspections, it is determined that exotic/invasive plants (see Southeast Exotic Pest Plant Council <http://www.exoticpestplantcouncil.org/>) are encroaching into areas of sensitive plant communities [i.e., *Hydrastis canadensis* (goldenseal), *Cypripedium acaule* (pink lady-slipper), and *Panax quinquefolius* (ginseng)], Horizon Center LLC will make a good faith effort to eliminate the encroachment (a determination on the best method of removal will be made on a case-by-case basis). This maintenance will provide the mitigation needed to help reduce or eliminate potential impacts (i.e., degradation) to the sensitive plant communities.

Horizon Center LLC will be held responsible, under the terms of the Quitclaim deed and their lease, to ensure that they maintain the integrity of the Natural Area, and that they take appropriate measures to prevent significant adverse impacts to the sensitive resources within the Natural Area. Use of the Natural Area will be permitted as long as that use is non-intrusive and consistent with the natural environment (e.g., walking paths). Encroachment into the Natural Area for additional infrastructure development may be necessary and if so, it will be done in accordance with the appropriate regulations and the conditions specified in the lease. Construction of habitable structures within the Natural Area will be prohibited. Encroachment into the sensitive areas where federal or state-listed species are known to occur will be prohibited. If unanticipated impacts to the sensitive resources take place that could cause significant adverse impacts, especially those resources protected by law (e.g., wetlands, T&E species, and surface waters), Horizon Center LLC will be required to take mitigation measures, such as rehabilitation, restoration and/or compensation, as appropriate. Enforcement mechanisms are in the lease and the Quitclaim Deed in the event that Horizon Center LLC or any of its successors, transferees, or assigns fails to abide by their provisions. DOE will also be able to conduct mitigation within the Natural Area if it becomes necessary, since they will maintain ownership.

3.2 CULTURAL RESOURCES

Horizon Center LLC will be responsible for the continued protection of the McKamey-Carmichael cemetery and sites 40RE195 and 40RE200 (Fig. 1.1). Horizon Center LLC, or its designee, will conduct annual inspections of the perimeter of the McKamey-Carmichael cemetery and the 100-ft buffer zone around sites 40RE195 and 40RE200 to ensure that their integrity has not been compromised. Inspection results will be included in the Annual Reports.

If, during any development activities, an unanticipated discovery of cultural materials (e.g., human remains, pottery, bottles, weapon projectiles, and tools) or sites is made, all ground-disturbing activities in the vicinity of the discovery will be halted immediately. If the discovery is made on DOE-owned property then Horizon Center LLC will be responsible for immediately informing the DOE-Oak Ridge Operations Cultural Resources Management Coordinator. DOE will be responsible for contacting the Tennessee State Historic Preservation Office and the Eastern Band of Cherokee Indians Tribal Historic Preservation Office for completing consultation prior to any further disturbance of the discovery-site area. If on the other hand, the discovery is made on property where title has been transferred then the required consultations will be made by the property owner.

4. REVIEW AND REPORTING REQUIREMENTS

Prior to transferring title of the developable parcels, Horizon Center LLC will perform a review, using the information in the MAP and the Annual Reports, to determine if there is a potential for the property owner to significantly impact any of the sensitive resources found in the Natural Area. This review should occur prior to the following scenarios:

- A new occupant constructing on Parcel ED-1,
- A change to an existing operation that has the potential to adversely impact any sensitive resources contained within the Natural Area,
- A significant change to the habitat that is adjacent to Parcel ED-1 (e.g., TDOT expansion of SR 95),

The results of this review will be coordinated with the responsible DOE Program office. If there is the potential for a significant impact to a sensitive resource as determined by DOE or Horizon Center LLC, then it will be necessary to review the monitoring and mitigation requirements in the MAP to determine if changes are necessary. This MAP review will be conducted by DOE. Every effort will be made to conduct the MAP review in a timely manner. As a guideline, the review should take no more than 20 days to complete. The extent of the review will be based on the potential for impacts to sensitive resources. If additional time is required then this activity will be coordinated with the Horizon Center LLC to make sure that there is not an adverse impact to their schedule. At a minimum, the MAP should be reviewed once every 3 years to determine if modifications are necessary.

DOE will continue to publish Annual Reports on the implementation of the MAP. Copies of the annual reports will be placed in the DOE Information Center and a notice of availability will be made to the public.

5. REFERENCES

DOE (U.S. Department of Energy) 1996a. *Environmental Assessment – Lease of Parcel ED-1 of the Oak Ridge Reservation by the East Tennessee Economic Council*, DOE/EA-1113, April.

DOE 1996b. *Mitigation Action Plan – Lease of Parcel ED-1 of the Oak Ridge Reservation by the East Tennessee Economic Council*, DOE/EA-1113, April.

DOE 1997. *Annual Report – Implementation of Mitigation Action Plan for DOE/EA-1113: Lease of Parcel ED-1 of the Oak Ridge Reservation, Oak Ridge, Tennessee, Pre-Development Ecological Surveys*, DOE/EA-1113/MAP-97, November.

DOE 1998. *Annual Report – Implementation of Mitigation Action Plan for DOE/EA-1113: Lease of Parcel ED-1 of the Oak Ridge Reservation, Oak Ridge, Tennessee*, DOE/EA-1113/MAP-98, December.

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- DOE 2000. *Annual Report – Implementation of Mitigation Action Plan for DOE/EA/1113: Lease of Parcel ED-1 of the Oak Ridge Reservation, Oak Ridge, Tennessee*, DOE/EA-1113/MAP-00, December.
- Hamel, P.B., Smith, W.P., Twedt, D.J., Woehr, J.R., Morris, E., Hamilton, R.B., and Cooper, R.J., 1996. *A Land Manager's Guide to Point Counts of Birds in the Southeast*, Gen. Tech. Rep.
- TDEC (Tennessee Department of Environment and Conservation) 2002. *Tennessee Erosion & Sediment Control Handbook: A Guide for Protection of State Waters through the use of Best Management Practices during Land Disturbing Activities*, available at http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/index.html. March.

6. GLOSSARY

Community Reuse Organization—A governmental or non-governmental organization that represents a community adversely affected by DOE work force restructuring, and that has the authority to enter into and fulfill the obligations of a DOE financial assistance agreement. For the Oak Ridge Operations office, CROET is this organization, and for Parcel ED-1 their subsidiary, Horizon Center LLC, is the transferee.

Environmental Assessment—A written environmental analysis that is prepared pursuant to NEPA to determine whether a federal action would significantly affect the environment and, thus require preparation of a more detailed Environmental Impact Statement (EIS).

Environmental Impact Statement—A document required of federal agencies by NEPA for major projects or legislative proposals significantly affecting the environment. A tool for decision-making, it describes the positive and negative effects of the undertaking and lists alternative actions.

Finding of No Significant Impact—A document prepared by a federal agency that presents the reasons why a proposed action would not have a significant impact on the environment and, thus would not require preparation of an EIS. A FONSI is based on the results of an EA.

Fragmentation—The disturbance or destruction of large contiguous areas of habitat into smaller, often isolated, portions or habitat patches.

Mitigation—Measures taken to reduce adverse impacts on the environment. According to 40 *CFR* 1508.20, mitigation includes: (1) avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; or (5) compensating for an impact by replacing or providing substitute resources or environments.

Natural Area—That portion of Parcel ED-1 formerly referred to as the Exclusion Area. The Natural Area contains important ecological and scenic features of the parcel (e.g., cave, springs, limestone cliffs, wetlands, rare and sensitive species and habitat, wildlife corridors, floodplain and stream buffer for EFPC and Dace Branch, and cultural resources).

Post-development—Occurring during site or facility development and/or construction and during industrial operations.

Pre-development—Prior to any site disturbance or construction activities. Pre-development monitoring was completed in 1996 and the results are included in the Annual Report published in 1997.

Sensitive Resources—Important ecological, cultural, and scenic features located within the portion of Parcel ED-1 referred to as the Natural Area and protected by a variety of regulations. These resources are shown on Figure 1.1 and include a cave, sinkholes, canebrakes, springs, wetlands, rare species locations, east and west wildlife corridors, walnut plantations, beech-maple forest, EFPC and Dace Branch buffer zones, and the McKamey-Carmichael cemetery.

Tri-annual—Occurring or being done 3 times per year.

Triennial—Occurring or being done once every 3 years.

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